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*Your attention is invited*

# NEWS OF THE SOIL MECHANICS AND FOUNDATIONS DIVISION OF ASCE

JOURNAL OF THE SOIL MECHANICS AND FOUNDATIONS DIVISION
PROCEEDINGS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

DIVISION ACTIVITIES
SOIL MECHANICS AND FOUNDATIONS DIVISION
Proceedings of the American Society of Civil Engineers

NEWS

June, 1961

## RECENT ACTIONS BY EXECUTIVE COMMITTEE

The members of the Division may be interested in knowing that their Executive Committee, in addition to employing correspondence extensively, attempts to meet at least twice yearly to plan, organize and administer the many technical activities of the Division. One such meeting was held on February 4 and 5 in Chicago.

Among the many actions taken by the Executive Committee of the Division at that meeting, the following may be of special interest to Division members:

(1) Discussion of means of increasing the effectiveness of the Division by
   (a) Integration of younger engineers into the work of the various Division Committees
   (b) Increasing the activities of local section committees
   (c) Developing increased collaboration with the Soil Mechanics Divisions of the American Society for Testing Materials and the Highway Research Board.

(2) Endorsement of the idea of attempting to arrange an Undergraduate and Graduate Curriculum Study Conference in Soil Mechanics and Foundation Engineering under the sponsorship of the National Science Foundation.

(3) Review of plans for technical sessions at forthcoming Conventions. Details of the program for the Phoenix Convention were included in the February issue of Civil Engineering. For the New York Convention in October the program will include one session on earth retaining structures, one session on local soil problems and two sessions on soil properties.

(4) Appointment of a Committee to study possible contributions by the Division to support the National space effort in connection with the study of soil properties on the moon.

(5) Creation of a Committee on Foundations under the Chairmanship of W. F. Swiger, to cover an area of technical interest not so specifically covered in recent years.

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Should such items suggest other matters that members believe should be considered by the Executive Committee, they are cordially invited to send their suggestions to the Chairman, T. M. Leps, California Edison Company, P. O. Box 351, Los Angeles 53, California or to the Secretary, H. B. Seed, Department of Civil Engineering, University of California, Berkeley 4, California.

## MIT SUMMER PROGRAM ON THE SHEAR STRENGTH BEHAVIOR OF COHESIVE SOILS

The Massachusetts Institute of Technology announces a two-week summer program on "The Shear Strength Behavior of Cohesive Soils" to be given from August 28 through September 8, 1961. The program is designed to provide educators, researchers, and practicing engineers with a comprehensive understanding of the latest developments in the area of strength behavior of cohesive soils and the principles which lay the groundwork for utilizing the new knowledge in actual practice and research.

The first half of the program will in essence be a "course" aimed at presenting a consistent picture of the current state of knowledge in five main areas: generalized shear strength behavior; the measurement of shear strength; the general principles used to explain and predict strength behavior; observed deviations from these general principles; and the mechanics involved in using shear strength in stability analyses. These lectures will deal primarily with saturated cohesive soils. A partial list of specific topics to be covered is:

1. The effective stress principle
2. Undrained strength as a function of water content, consolidation pressure, over-consolidation ratio, and effective stress at failure
3. Failure criteria and strength envelopes
4. Stress versus strain behavior
5. Factors influencing strength and pore pressure such as strain rate, anisotropic consolidation, and type of shear
6. Methods for predicting field strength from laboratory tests and the problems involved

This portion of the program will be presented primarily by members of the M.I.T. Soil Engineering Division.

The second half of the program will deal with selected topics about which there is currently considerable research and controversy. Some of the topics to be discussed are:

1. Effects of non-uniform stress conditions on shear strength and pore pressure behavior as measured in the triaxial test
2. Shear strength mechanism and influence of environment and soil composition on strength behavior
3. Effective stress equations for partially saturated clays and measurement of pore air and water pressure in partially saturated clays
4. Prediction and measurement of pore pressures and strength in the field.

Guest lecturers will participate in this portion of the program.

The lectures will be supplemented by discussion periods, a tour of M.I.T.'s Soil Engineering Laboratory, participation in triaxial testing (if desired), and a review of M.I.T.'s current research program in Soil Engineering.

The program will be under the direction of Dr. T. William Lambe, Professor and Head of the Soil Engineering Division. Other members of the M.I.T. staff who will participate in the program include: Professor R. V. Whitman and Messrs. C. C. Ladd and R. M. Harkness. Visiting lecturers include Dr. R. E. Gibson, Lecturer in Civil Engineering, Imperial College of Science and Technology, London, England, and others who will be announced later.

Those interested in obtaining further information concerning this special summer program should write: Director of the Summer Session, M.I.T., Cambridge 39, Massachusetts.

## COASTAL ENGINEERING SHORT COURSE AT UNIVERSITY OF FLORIDA

The first coastal engineering short course ever to be held in the United States was conducted at the University of Florida from January 30 through February 4, 1961. Some of the topics discussed during the course were coastal and inlet hydraulics, harbor hydraulics, coastal protection, harbor transportation systems, storm floods, flood control, the use of hydraulic models, the services offered by coastal engineering laboratories and the educational program in coastal engineering. In addition, approximately 20 percent of the instruction time was devoted to soil mechanics and foundation engineering.

The program and the administration of the meeting were under the joint direction of the University's Civil Engineering Department, Ralph W. Kluge, Head Professor, and the Coastal Engineering Research Laboratory headed by Dr. Per Bruun. Professor Franciscus Gerritsen was short course supervisor. There were approximately 100 registrants.

Col. Carlton S. Proctor, senior partner of Moran, Proctor, Mueser and Rutledge, was a guest participant. He led an evening seminar in soil mechanics with a lecture on "Foundations for Marine Structures." Additional lectures by Professors F. E. Richart, Jr., W. H. Zimpfer and J. H. Schmertmann of the Civil Engineering Department dealt with the theory and application of soil mechanics in coastal engineering problems.

## NEWS FROM THE ILLINOIS SECTION

The January meeting of the Soil Mechanics and Foundations Division of the Illinois Section, A.S.C.E., featured Mr. Theo. Van Zelst, President of Soiltest, Inc., and V. P. of CENCO Instruments Corp. Mr. Van Zelst discussed International Focus on Engineering Testing, briefly reviewing the testing techniques and equipment used throughout the world. His talk was based upon reports received from businessmen in 65 different countries. For an interesting and informative program, we thank Mr. Van Zelst for his report on how the other half tests.

The Group's February meeting featured a discussion and film of the grouting techniques employed on Mission Dam of the Bridge River Project, Vancouver, B. C. by Mr. Henri Fabregue, Soletanche and Assoc. and Mr. Emile Huni, Consulting Engineer, Vancouver, B. C. These gentlemen are to be commended for an excellent explanation of a grouting method as yet untried in this country.

## PORE PRESSURE AND SUCTION IN SOILS

A book containing seventeen complete papers preserved by contributors from seven different countries is available with illustrations, clothbound for $11.25. For more information write: Butterworth Inc., 7235 Wisconsin Avenue, Washington 14, D. C.

The seventeen papers which make up this book were presented by contributors from seven different countries, including the United States. The Conference was divided into three Sessions covering General Principles and Laboratory Measurements: Earth Dams, Embankments and Foundations: and Roads and Runways and Agriculture.

The papers are reproduced in full, with details of the ensuing discussions:

## COMPLETE LIST OF PAPERS

1. Contribution a la mesure des pressions interstitielles.
2. Les Recherches sur la Succion des Sols.
3. The Measurement of Pore Pressure in Sand under Rapid Triaxial test.
4. A Revised Effective Stress Law for Use in the Prediction of the Behavior of Unsaturated Soils.
5. Pore Pressure and Suction in Soil.
6. The Measurement of Pore Pressure in the Triaxial Test.
7. Relationships of Moisture Stress and Effective Stress Functions in Unsaturated Soils.
8. A Study of the Response Time of Various Types of Piezometer.
9. Suction in Swollen Clays.
10. Some Developments in the Measurement of Pore Pressure.
11. Field Observations on Pore Pressures in London Clay.
12. Investigation of the Stability of an Earth Dam subject to Rapid Drawdown including Details of Pore Pressures recorded during a Controlled Drawdown Test.
13. Pore-Pressure Observations at Selset Dam.
14. Pore-Pressure and Settlement Measurements during Small-Scale and Laboratory Experiments to determine the Effectiveness of Vertical Sand Drains in Peat.
15. Pore Pressures resulting from driving Piles in Soft Clay.
16. Pore-Water Pressure Observations in a Saturated Alluvial Deposit Beneath a Loaded Oil Tank.
17. Soil Suction and Water Movement.

## SCREENINGS from the SOIL RESEARCH LABORATORY

Professor R. L. Handy, of Iowa State University, has forwarded to us copies of the publication SCREENINGS, from the Soil Research Laboratory, published by the Iowa Engineering Experiment Station, Iowa State University of Science and Technology.

Each issue is generally directed along one theme, such as Dams, Rivers, Frost Action, etc. Condensations of two recent numbers are included for your information and to acquaint you with the nature of this publication. Professor Handy aims at a broad spectrum of readers, including those not technically trained in Soil Mechanics and Foundation Engineering.

## DAMS

This review of dams puts major emphasis on earth dams. A pioneer builder was the beaver, which shows that engineering is a very old profession if not the very oldest, traditions to the contrary. Kinds of dams include timber or timber crib, gravity, hollow gravity, and perhaps most spectacular, arch dams. If arch dams are the glamour girls, earth dams are the older girls where uplift fails. Earth dams include the largest man-made structures in the world; Ft. Peck equals the volume of 32 Great Pyramids, with enough mud left over for 27 general elections. Small earth dams also are popular for flood control, leading to conflicting views on which is more effective. Presently the highest earth dam built is Trinity in California, 537 feet, and the proposed Oroville in California will be 730 feet high, or 4 feet higher than Hoover and the highest in U. S.

Design of earth dams includes use of drop inlets, emergency spillways, and riprap for erosion control. A hydraulic jump may be used to decrease erosion downstream. Seepage may be reduced by use of a clay core, clay core and cutoff, clay core and upstream blanket, and/or grouting. Seepage is calculated by means of a flow net and the Darcy equation. Another design problem is stability of the slope, which may be increased by flattening the slope angle, incorporating toe drains, and avoiding sudden drawdown of the reservoir.

Earth dams are usually built of rolled earth fill, the huge construction machines roaring in a fabulous display of power, speed, and timing. If built too fast, excess pore water pressure may cause slides. Large dams require years to build, culminating in the unique triumphant drama of final closure. Closure of Oahe in 1958 is described and pictured.

## CRUISING DOWN THE RIVERS

In this issue, SCREENINGS presents in graphic style and good humor an illustrated review of alluvial morphology, including results of field research on the Missouri River flood plain along Iowa.

All the world's a stage, with running water the principle stage hand; rivers are confederated raindrops, at first cutting downward in a series of nickpoints, then slashing laterally after the downcutting is controlled by base level. Mature streams include braided streams, which are particularly prominent in two environments—in dry regions, and in streams issuing from glaciers. A special case of braiding is the alluvial fan. Another breed of mature stream is meandering streams, which are the glamour folk of the stage, winding and weaving a musical fantasy. Meanders dissipate energy as heat, and incidentally increase channel length, decreasing gradient and velocity. Loop radii are about two to three times channel width. Water flowing through a meander scours deep along the outside bank, creating a catfish haven—hill talk for heaven. Meanders slowly migrate downstream, leaving sand point bars.

Likewise discussed and presented are the origin and appearance of chutes, chute cutoffs, oxbows, clay plugs, neck cutoffs, natural levees, crevasses, and backswamp clays or slackwater deposits.

Iowa is uniquely bounded by two major rivers, the Mississippi and the Missouri. The Missouri is young, having once flowed north to Hudson Bay. It now serves as a rough marker of the southward extent of continental

glaciation. The flood plain along Iowa is up to 18 miles wide and mostly on the east side of the river, perhaps due to Coriolis effect (explained in footnote). Three Missouri River environments in Iowa are recognized; a wide flood plain consisting of channel belt, meander belt, and flood basin deposits, Sioux City to Crescent; a narrow flood plain, mostly channel belt and meander belt, Crescent to the mouth of the Platte; and a narrow, more steeply graded flood plain and semi-braided river south of the entry of the Platte.

Missouri River point bars classify as sand or sandy loam, A-3, covered by a variable thickness of A-7 silt + clay, which is analogous to backswamp deposits. Natural levees are usually clay, but may be A-4, A-6, or A-7, and grade laterally into A-7 backswamp clay. Fans from tributary valleys along the flood plain margin usually classify as silty clay loam, A-6 or A-7. Underneath the Missouri flood plain deposits is a sand and gravel-filled canyon 70 to 150 feet deep, origin of which is debated.

## A STUDY TOUR TO THE FIFTH INTERNATIONAL SOILS CONFERENCE

Study Abroad, Inc., is offering a five-week European tour that provides for attendance at the Fifth International Conference on Soil Mechanics and Foundations in Paris July 17-20. After a week in France the tour moves on to the Road Research Laboratory at London, then to Holland for a study of dike planning and construction. Cold climate engineering at Oslo is investigated enroute to Russia via Helsinki. Reconstruction of World War II devastated areas will be seen at Leningrad, and soils people will hear about vibration driving of piles at the Academy of Construction and Architecture in Moscow.

Returning via Vienna the tour group will learn about unusual foundations at Venice and Pisa. Modern dams and ancient engineering will also be seen in Italy. Engineering works and laboratories in Spain and Portugal will be visited enroute home.

At the week-long Fifth International Conference on soils in Paris widely known experts from all parts of the world will present papers and discussions. All new developments since the Fourth World Soils Conference in London in 1957 will be covered. Research results in testing and new testing methods, as well as equipment, will be fully reported. English is one of the official languages of the conference.

Hal Hunt, construction engineer and Editor of CIVIL ENGINEERING, and M. D. Morris, soils consultant and author, are co-directors of the tour. Both have had extensive travel and engineering experience and can point out usable ideas in every operation visited. The tour is managed by Study Abroad, Inc., who have supervised successful study group travel for Temple University and others for several years. Address inquiries to: Study Abroad, Inc., 250 West 57th Street, New York 19, New York.

## NEW TASK COMMITTEES

Members of the Division serving on two new Task Committees, recently authorized by the ASCE Committee on Division Activities, are as follows:

## TASK COMMITTEE ON METHODS OF UNDISTURBED SOIL SAMPLING

J. O. Osterberg (chairman)
W. G. Holtz
M. J. Hvorslev
J. Lowe, III
J. D. Parsons

## TASK COMMITTEE ON STATIC AND DYNAMIC PENETRATION TEST METHODS

H. O. Ireland (chairman)
B. K. Hough
G. Fletcher
J. D. Parsons
M. J. Hvorslev

## NEW COMMITTEE ON GROUTING

Under the active direction of the Committee on Grouting, a number of reports and papers on the various methods and techniques of grouting have been published by the Division in recent years. Cooperating in this effort have been the Administrative Committee on Grouting, and the three Task Committees on Cement, Clay and Chemical Grouting.

Having accomplished their initial objectives these Committees have recommended a reorganization of the Committee structure and the establishment of a single Committee on Grouting with responsibilities embracing cement, chemical, bituminous and clay grouting procedures. This recommendation has been approved by the Executive Committee of the Division and a new committee appointed. Members of the Division appointed to the new Committee are: Judson P. Elston, Chairman, B. E. Clark, F. H. Lippold, J. M. Polatty, A. E. Ross, W. K. Seaman, F. C. Sturges and J. Lowe, III (contact member). The membership of the Committee may be broadened eventually as the scope of activities increases.

## AUGUST NEWSLETTER

Deadline date for arrival at this office of contributions for the August Newsletter: June 30, please.

Bernard B. Gordon, Assistant Editor
Porter, Urquhart, McCreary, and O'Brien
1140 Howard Street
San Francisco 3, California

Wilbur M. Haas, Assistant Editor
Michigan College of Mining and Technology
Houghton, Michigan

J. H. Schmertmann, Assistant Editor
College of Engineering
University of Florida
Gainesville, Florida

Alfred C. Ackenheil, Editor
University of Pittsburgh
Civil Engineering Department
Pittsburgh 13, Pennsylvania

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## TO ASCE MEMBERS OF CHI EPSILON

Chi Epsilon Fraternity, national civil engineering honor society, has officially offered to supply the funds necessary to furnish a formal Conference Room at the United Engineering Center. This room will be on the ASCE executive floor, will be named "The Chi Epsilon Room," and will be available for conference and committee meetings.

Pledges are not expected, but single voluntary gifts, from members and friends of the Fraternity are earnestly solicited. An attractive Commemoration Book has been planned in which donors of $100 or more (singly or in groups) may inscribe the name of a revered person.

On request, the national chairman, Samuel Kramer (8701 Shore Road, Brooklyn 9, New York) will be glad to mail a descriptive brochure. Your gift is tax deductible if you make your check out to "ASCE CHI EPSILON ROOM FUND" and mail it to Mr. Donald D. King, ASCE, 33 West 39th Street, New York 18, N. Y. Your gift will be automatically credited to the quota of your initiating Chapter. The national goal is $10,000.

## CUMULATIVE INDEX TO ASCE PUBLICATIONS

A three-part index to Proceedings, Transactions, and CIVIL ENGINEERING is now available. This 816-page, 6 in. by 9 in., blue cloth bound book contains a subject and name index for CIVIL ENGINEERING that covers the magazine since its inception in 1930 through 1959. For Proceedings, the coverage is from 1950 through 1959, a period in which most papers were not included in Transactions. The 1935 through 1959 Transactions are indexed to provide a valuable source of reference to "modern" technical civil engineering literature.

The list price for this volume is $20.00. Members of ASCE and public and school libraries are entitled to a 50% discount and will, therefore, pay $10.00 per volume.

Order your copy of this INDEX by use of the coupon herewith.

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## BIBLIOGRAPHY ON AIRPORT ENGINEERING

This comprehensive "Bibliography on Airport Engineering" chronicles and catalogs the engineering knowledge and experience that has appeared in papers, articles, and reports in the publications of the free world from 1938 to 1959. The Bibliography has grown out of the file maintained by the author, Shu-t'ien Li, F. ASCE, and has been augmented and verified in technical libraries in the United States.

ASCE publication 1960-41 is divided into 26 chapters and has a total of 2,335 entries. The subjects covered are, in part, location and planning, design and maintenance, earthwork, drainage, pavements (both rigid and flexible), lighting, hangars, heliports, and unit costs. Of special importance at this time is a chapter (with 169 entries) dealing with launching bases, space stations, and allied subjects.

The list price for this 184-page hard-bound book is $8.00; ASCE members and public and school libraries receive a 50% discount. The coupon herewith should be used to order this book.

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## ROCKFILL DAM SYMPOSIUM

The 24 papers in the Symposium on Rockfill Dams were planned to provide design, construction, and performance data on most of the world's higher rockfill dams. The resulting discussions introduce data on additional dams and bring the performance data up to date on the dams in the papers. The detailed presentation of settlement data was emphasized as being of particular value.

This 712-page cloth-bound book is now available as ASCE Transactions, 1960, Vol. 125, Part II. The list price is $12.00; ASCE members and public and school libraries will be charged $6.00.

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